



National Water Quality Monitoring Council

Working together for clean water



Working Together For Clean Water: 2015-2016 Council Highlights

Each day, water-quality issues become more complex and the need to address them more urgent. The demand for clean, pure water continues to grow. At the same time, budgets to monitor, assess, protect and restore our waters are tighter, forcing scientists and managers to attempt to do more with less. The National Water Quality Monitoring Council (NWQMC) exists to bring together the diverse expertise needed to develop collaborative, comparable, and cost-effective

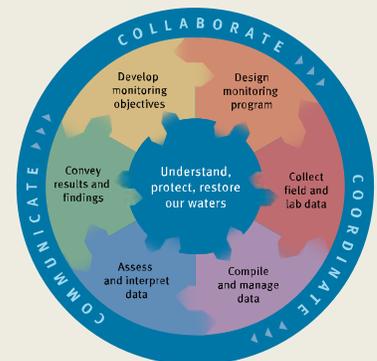
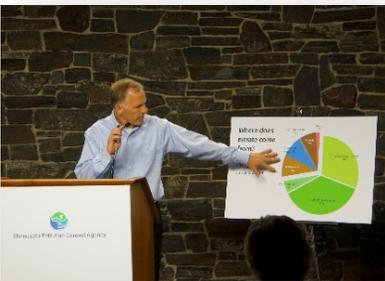
approaches to monitor and assess our Nation's water quality (acwi.gov/monitoring/). These approaches are fundamental to the successful management and sustainability of our water resources.



The NWQMC and its partners have made significant advances in setting priorities, including data management and information dissemination; compatible web services; State and regional councils; volunteer monitoring; assessment and statistical tools; sensors and real-time

monitoring; and various tools for sharing and communicating developments and innovations in the monitoring community. Many NWQMC products and services are now available to help meet water needs across the Nation.

Created in 1997, the National Water Quality Monitoring Council (NWQMC) is a national forum for coordination of comparable and scientific defense methods and strategies to improve water quality monitoring, assessment and reporting. The NWQMC brings together scientists, managers, and citizens to ensure that information about the quality of our water resources is accurate, reliable, and comparable. The NWQMC fosters collaborative and cost-effective approaches to improve and advance the science of water-resources monitoring. The NWQMC is chartered as a subgroup of the Advisory Committee on Water Information under the Federal Advisory Committee Act.



The Monitoring Framework

Council Workgroups

Methods and Data Comparability Board (Methods Board) – Provides a forum for evaluating and promoting methods that facilitate comparability among water-quality monitoring and analytical methods. (Contact: Dan Sullivan, djsulliv@usgs.gov, (608) 821-3869)

The **Aquatic Sensor Workgroup** is a subcommittee of the Methods Board that has focused on quality control and data management of sensor data. (Contacts: Dan Sullivan, djsulliv@usgs.gov, (608) 821-3869)

Water Information Strategies Workgroup – Defines and promotes strategies for monitoring designs; data management, access, and exchange; data integration and analysis; and information reporting to address water needs. (Contacts: Mary Skopec, mary.skopec@dnr.iowa.gov, (319) 335-1579, Doug McLaughlin, douglas.mclaughlin@wmich.edu, (269)-276-3545)

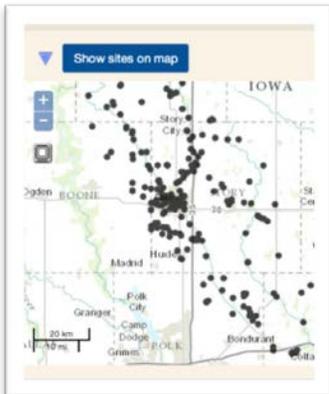
Collaboration and Outreach Workgroup – Works to build partnerships that foster collaboration and communication within the water-quality monitoring community. (Contacts: Candice Hopkins, chopkins@usgs.gov, (208) 387-1331, and Danielle Donkersloot, Danielle.Donkersloot@dep.nj.gov, (609) 633-9241)

National Network of Reference Watersheds – Defines and promotes strategies for improved coordination and collaboration for sharing and accessing reference watershed information and water-quality data for freshwater streams (Contacts: Mike McHale, mmchale@usgs.gov)

Volunteer Monitoring Working Group – Engages key members of the NWQMC in volunteer monitoring-related discussions to better encourage integration of volunteer monitoring activities with ongoing water-quality monitoring conducted by local, state, and federal agencies. (Contacts: Danielle Donkersloot, Danielle.Donkersloot@dep.nj.gov, (609) 633-9241 and Julie Vastine, vastine@dickinson.edu, (717) 245-1135).

Water Quality Portal – Strategic Plan for the Future

The Water Quality Portal is a collaborative effort of the NWQMC, USEPA, and USGS that creates a single, user-friendly web interface to locate water-quality data collected by Federal, State, and tribal partners. It contains over 150 million public water-quality data records that can be accessed and downloaded in a variety of formats. Since it was launched in 2012, over 36,000 unique visitors have accessed the Portal for water quality data records. On a given week day, there are between 50-150 visits and as many as 24,000 downloads via the Portal web services. The increased use of the services means that there are now more users accessing the Portal through automated processes than person visits, a clear demonstration of the value of the Portal. In fact, in a recent 24 hour period, web service calls successfully downloaded nearly 5.5 billion rows of data.



Map output from the *Water Quality Portal* showing sites where water nutrient samples have been collected in the South Skunk Basin. The merged dataset includes NWIS, STORET, and STEWARDS sites.

In early 2014, the Portal Team – supported by USEPA and USGS – worked with the USDA Agriculture Research Service to make their water-quality data available through the Portal. STEWARDS (Sustaining the Earth's Watersheds, Agricultural Research Data System) is the USDA ARS's repository of data from ARS research watersheds. The teams have worked together over the past two years to map ARS data to the Water Quality eXchange (WQX) schema and resolve other technical data migration issues. Users can now query data from USGS National Water Information System (NWIS), USEPA Storage and Retrieval Data Warehouse (STORET), and USDA STEWARDS databases simultaneously. To date, ARS has contributed 1,103,291 sample results from 169 sites.

The Portal continues to expand its utility by accessing monitoring methods in the National Environmental Methods Inventory (NEMI). It leverages the NEMI analytical method catalogue, which allows an immediate display of station and data queries on a NEMI mapping interface. Now, water managers and data analysts can quickly link a sample result to the full method that was used to determine that result. Other major functionality added includes the ability to query for and retrieve biological collection data and an open web mapping service.

In 2016, the Portal team developed a strategic plan that will guide Portal development during the next few years. The need for such a strategic plan emerged as demand for Portal functions continued to expand and increase in complexity from both a data management and data retrieval viewpoint. To access a copy of the strategic plan, please visit acwi.gov/monitoring/. Visit the **Water Quality Portal on the Web** at www.waterqualitydata.us. (Contacts: Jim Kreft, jkreft@usgs.gov, (608) 821-3919).

Establishing a National Network of Reference Watersheds for Freshwater Streams



A unique national network of pristine and minimally disturbed watersheds is the focus of

the NWQMC's effort to address the need for reliable long-term data and information about watersheds that are minimally disturbed by human activities. The National Network of Reference Watersheds (NNRW) is a web-based data delivery system with a collaborative, multipurpose design that emphasizes chemical, physical, and biological aspects of water quality and integrates, to the extent possible, with existing networks. The NNRW has defined a set of "core" reference watersheds that includes the least disturbed watersheds having the longest periods of record for selected water-quality data. The NNRW web-based resource allows users to define their own reference criteria to identify watersheds that best meet their specific needs and objectives. Membership in the network is voluntary and open to interested individuals and institutions. More information and access to the NNRW at: my.usgs.gov/nnrw/main/home (Contact: Mike McHale, mmchale@usgs.gov, (518) 285-5675).

Volunteer Monitoring and Citizen Science

Connecting volunteer monitoring groups to existing and new resources as well as to each other and with other monitoring efforts is the purpose of the NWQMC's new Volunteer Monitoring Working Group. The group's web page contains an explanation of why volunteer monitoring is effective and important, provides information and links to the USEPA's volunteer monitoring list serve, highlights volunteer monitoring success stories, links to a "how-to" library compiled by the National Water Resource project, and lists other key resources. The website also includes an interactive map of where volunteer monitoring programs are located. The NWQMC's Working Group aims to increase volunteer monitoring opportunities, enhance national communication, and promote volunteer monitoring as a viable tool for agencies and organizations. For more information, visit the group's webpage at acwi.gov/monitoring/vm (Contact: Danielle Donkersloot, Danielle.Donkersloot@dep.nj.gov, (609) 633-9241 and Julie Vastine, vastine@dickinson.edu, (717) 245-1135).

National Environmental Methods Index

The National Environmental Methods Index (NEMI) one of the NWQMC's flagship products since 2002, is an online resource of laboratory methods and field protocols, including more than 1,200 methods for chemical, biological, and physical monitoring (see www.nemi.gov/). NEMI methods are linked to sample results in the Water Quality Portal, allowing water managers and data analysts quick access to method information used to produce water-quality results. (Contact: Dan Sullivan, djsulliv@usgs.gov, (608) 821-3869 or Jim Kreft, jkreft@usgs.gov, (608) 821-3919).



Water Quality Monitoring: A Guide to Informed Decision Making

The Water Information Strategies (WIS) group has created a fact sheet series to help managers, non-technical audiences, policy makers, and the public understand how monitoring programs are designed to meet management needs. The fact sheets seek to improve understanding of how to design monitoring that addresses specific objectives and to further clarify that multiple designs may be needed to address a variety of Clean Water Act and management water information needs. Overall, the goal of the fact sheets is to provide succinct information to a less technical audience about basic elements of different monitoring designs, the questions answered by a particular design, the limitations and strengths of a design, and links to resources that may help with the implementation of a design. Fact sheets may also explain how existing monitoring may be leveraged to meet as many objectives as possible. Fact sheet topics include:

- *Monitoring designs* (probabilistic/statistical surveys; targeted monitoring; rotating basins; fixed trend networks); and
- *Using monitoring data* (water quality reporting through indices and report cards; statistical decision illustrator, and modeling of water quality data).

The fact sheets are intended to be templates that can be modified using local examples to customize the message for the appropriate audience. Water Quality Monitoring Fact Sheets will be available online at the NWQMC's website (acwi.gov/monitoring/). (Contact: Mary Skopec, mary.skopec@dnr.iowa.gov, (319) 400-0442).

Decision Illustrator now Available!

Water resources professionals regularly rely on monitoring data to make important decisions regarding public health and safety and natural resource conditions. However, while monitoring is essential to making good water management

decisions, it always carries with it an element of uncertainty. Understanding how to characterize, communicate, and manage that uncertainty presents an important challenge to good water resources decision-making.

One important type of uncertainty can be described in terms of the statistical confidence with which some value used in decision-making can be estimated from a set of monitoring results. Statistical confidence is often influenced by a sometimes-complicated interaction between the number of measurements made, measurement precision, and the variability encountered in the environment, and this complexity can be difficult to communicate to environmental managers and interested stakeholders.

To help support the NWQMC monitoring framework fundamentals of Coordination, Communication, and Collaboration on this important topic, members of the WIS workgroup are developing an interactive Microsoft Excel® spreadsheet tool called the "Water Resources Statistical Confidence Illustrator" (the "Illustrator" for short). The Illustrator focuses on a specific, common water quality assessment challenge, i.e., comparing an average of several measurements with a numeric threshold used to distinguish between desirable and undesirable water quality conditions. It provides a simplified but useful way to explore factors that can influence the confidence in statistically supported decision-making in water quality assessments. Because it is intended primarily as a learning and communication tool, WIS hopes that the Illustrator can foster improved dialogue and understanding of how monitoring can best reduce uncertainty and improve water resources decision-making. A beta version of the Illustrator is currently available for use, and feedback is welcome. (Contact: Doug McLaughlin, douglas.mclaughlin@wmich.edu, (269)-276-3545).

Aquatic Sensor Workgroup (ASW)

The ASW worked with partners in public and private sectors on a variety of efforts in the past two years. A position paper, "Emerging Tools for Continuous Nutrient Monitoring Networks: Sensors Advancing Science and Water Resources Protection" was recently published in the Journal of the American Water Resources Association (JAWRA) and is available at onlinelibrary.wiley.com/doi/10.1111/1752-1688.12386/full. Ongoing ASW collaborative efforts include the Nutrient Sensors Challenge and the Watershed Interoperability Experiment, both of which are featured at this year's



conference, along with a workshop to plan for the next round of sensor innovation. An illustrated deployment guide is in development and is available at acwi.gov/methods/sensors/ (Contact: Dan Sullivan, djsulliv@usgs.gov, (608) 821-3869).

The Council Continues to Reach Out to the Water Monitoring Community by:

- Sponsoring this biennial **National Monitoring Conference** to help water stakeholders exchange information and technology related to water monitoring, assessment, research, protection, restoration, and management, as well as to develop new skills and professional networks.
- Publishing the bi-annual online issues of **National Water Monitoring News**, highlighting recent activities of the national, State, regional, and tribal councils, watershed partnerships, and volunteer monitoring groups; projects, publications, tools, findings or announcements of interest to the water monitoring community (acwi.gov/monitoring/newsletter/).
- Hosting **webinars** representing a wide range of topics, speakers, and audiences such as:
 - Effective Science Communication
 - Continuous Monitoring for Nutrients: State of the Technology and State of the Science
 - Microplastics in Great Lakes Tributaries
 - Science-based Response to Bitumen Spills in Rivers

Webinars are recorded, transcribed, and posted to our **YouTube channel** (youtube.com/nwqmc) for convenient viewing. Sign up for our webinar listserv to stay informed of our upcoming webinars (acwi.gov/monitoring/webinars).

- Announcing products and information relevant to the monitoring community through our **LinkedIn Group** and **Twitter Account** (@NWQMC).

The NWQMC is dedicated to supporting and sustaining partnerships within the water monitoring community, including State, regional and tribal councils, as well as watershed groups and alliances, through these and many other outreach activities. (Contacts: Candice Hopkins, chopkins@usgs.gov, (208) 387-1331, and Danielle Donkersloot, Danielle.Donkersloot@dep.nj.gov, (609) 633-9241).

Additional information on NWQMC activities can be found on the website: acwi.gov/monitoring/.